

METHOD AND MEANS FOR MANAGING A LUMINESCENT LAPTOP KEYBOARD

FIELD OF THE INVENTION

This invention relates to enhancing the use of key-actuated information handling systems and, more particularly, to enhancing the use of portable self-powered, key-actuated systems in dark or low-level ambient light environments.

DESCRIPTION OF RELATED ART

Liquid Crystal Displays and Laptops

A liquid crystal display (LCD) is an information display comprising a picture element (pixel) addressable array. This pixel-addressable array is formed from a thin layered sandwich of glass plates, polarizing filters, transparent electrodes, and liquid crystal material. The variety of electro-optical effects associated with LCs permit LCDs to be fashioned into many different types of information displays. Because of the LCD's thin sandwich construction, the bulk associated with electron beam tube displays can be eliminated. Furthermore, many LCDs are reflective, meaning they use only ambient light to illuminate the display. Even where LCDs do require an external light source, they consume much less power than electron beam devices.

A "laptop" is defined as a microcomputer small enough to use on one's lap. Laptops are also referenced as "notebook" computers and will be used synonymously through the specification. The term "notebook" derives from the fact that laptop computers may be closed and carried, much like a closed book when not in use. Also, they may be opened up, as is a book, when being read. When so opened, the display occupies the top lid or cover portion and is approximately vertical and hinged to the bottom lid or cover portion. Relatedly, the latter contains information entry and processing facilities, and is electrically and logically coupled to the LCD. Laptops may be plugged into an electrical outlet or more conveniently powered by internal battery for several hours.

Aspects of Luminescence and Phosphorescence

It is well appreciated that "luminescence" is the emission of light by means other than combustion and therefore occurring at lower temperatures than are required for combustion. An example of luminescence is the light, or glow, emitted by a luminous watch dial. Luminescence contrasts with "incandescence", which is the production of light by heated materials.

It is also appreciated that when certain materials absorb various kinds of energy, some of the energy may be emitted as light in a process wherein (1) the incidental energy causes the electrons of the atoms of the absorbing material to become excited and jump from the inner orbits of the atoms to the outer orbits; (2) when the electrons fall back to their original state, a photon of light is emitted; and (3) the interval between the two steps may be short (less than $1/100,000$ of a second) or long (many hours).

It is further well appreciated that if the interval is short between energy absorption and emission as light, then the process is called "fluorescence". However, if the interval is long, the process is called "phosphorescence". In either case, the light produced is almost always of lesser energy, that is, of longer wavelength, than the exciting light. Restated, "phosphorescence" is the persistent emission of light following exposure and removal of incident radiation.

Laptops and Illuminated Keys

In the prior art, key-based information handling systems were used in darkened or low ambient light environments.

The Magee and Subbaroa patents take different approaches in enhancing key visibility.

Magee, U.S. Pat. No. 5,073,843, "Phosphorescent Key Pad", issued Dec. 17, 1991, disclosed a keypad illumination kit comprising a plurality of pads with adhesive backing on one side and phosphorescent information indicia on the other side. These pads were to be used for selective application to key tops on a keyboard or like data entry device for use in low or nonexistent ambient light conditions. The thickness of the material was sufficient to provide a desired amount of "phosphorescent excitation" for a desired length of time based upon a probable light exposure during those periods of illumination which are expected to charge the phosphors. This would avoid any need for an external light source as apparently required by art prior thereto.

Stracener, U.S. Pat. No. 4,449,024, "Backlighting Illuminated Keyboard", issued May 15, 1984, disclosed the use of an easily replaced single-point source of light diffused through a clear plastic diffuser and a translucent overlay defining a matrix of keys backed by actuable pins and electronic registration means. In the context of a battery-powered portable, such backlighting poses an unacceptable power drain.

SUMMARY OF THE INVENTION

It is accordingly an object of this invention to devise a method and means for improving the dark or low ambient light visibility of actuable keys in portable self-powered, key-based information handling systems as exemplified by a laptop or notebook computer.

It is a related object that such method and means use minimal power and rely upon as many of the facilities inherent in standard laptop or notebook computer configurations as possible.

The above objects are believed satisfied by a method and means for flash charging a plurality of phosphorescent-coated, touch-sensitive keys using a planar, light-transmissive multicolor liquid crystal display (LCD) where the position of a lid of the notebook within a critical angle of the base is the tripping event. In a notebook computer, the keys are operable as an information entry means residing within a base. A processor, also residing within the base, electrically and logically operates the LCD, the LCD being set within the lid and rotationally coupling the base.

More particularly, the flash-charging method comprises the steps of (a) rotating the lid such that the LCD lies within an acute dihedral angle α opposing the plurality of keys set within the base in the range $0 < \alpha < A$ degrees, where A is a predetermined value; and (b) causing the LCD responsive to the rotation of the lid as in step (a) to display and project a colored light within an appropriate spectral-charging region upon the phosphorescent-coated keys for a predetermined period of time. Optimally, the range of angles lies between zero and 15 degrees. Also, the invention contemplates that the lid will initiate activation of the LCD whether it is rotated from a position of closure with and away from the base but within the critical angle, or rotated from a position greater than the critical angle toward the base so as to lie within the critical angle.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 depicts a laptop or notebook computer in an operationally open position with a substantially obtuse dihedral angle between the lid and the base.

FIG. 2 shows a laptop or notebook computer in an operationally open position with a substantially acute dihe-